

# Mechanical Start Up Procedure

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**Document Number EN-MPS-722**

**Revision 2**

**Approved By [REDACTED]**

**McMurdo, Palmer, and South Pole Stations**

**02/14/05**

**Active Divisions/Departments**

**FEMC**

**NSF**

*Raytheon Polar Services Company*

*Facilities, Engineering, Maintenance, and Construction (FEMC)*

*Contract No. OPP 0000373*

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## **Purpose**

Mechanical start up procedure and tests are generally performed as a quality control measure to ensure manufacturer and project specifications were met during installation and start up of the equipment and/or system prior to bringing the equipment online.

## **Scope/Applicability**

These procedures standardize the RPSC FEMC start up testing while incorporating industry standards. This assures the equipment and associated systems are in working order and are in compliance with the design.

In this procedure, the below equipment/system start up procedures are discussed:

- Backflow Prevention
- Boilers
- Cabinet (Terminal) Heaters
- Fans
- Fan Coils
- Fuel Heaters
- Heat Exchangers
- Pump Start up
- RTU/AHU
- Storage Tanks
- Vacuum Pumps

## Terms and Definitions

**Amps**

Amperes

**DDC**

Direct Digital Control

**EWT**

Entering water temperature (influent)

**gph**

Gallons per hour

**gpm**

Gallons per minute

**HW**

Hot water

**LWT**

Leaving water temperature (effluent)

**psi**

Pounds per square inch

**rpm**

Revolutions per minute

**WC**

Water column

## Responsibilities

### FEMC

#### ***Facility Engineer/Project Engineer or Designee***

- Coordinates the Final Inspection with appropriate parties.
- Oversees/Participates in the Start Up, Test, and Inspection Process to ensure the Specifications and Procedures are followed.

### NSF

#### ***NSF or Designee***

Inspector for the NSF, who witnesses the testing and conducts the required inspections for the NSF.

## Mechanical Start Up Discussion

Prior to engaging any system, it is important to verify that all connections, fittings, and associated apparatus are installed properly to assure the system performs correctly, efficiently, and safely. Remove all packing and protective materials from the system that is to be tested.

## General Preparation for All Start Up Test Procedures

Before starting, obtain the latest revision of the Plans, Specifications, and the approved shop drawings of the complete system and its associated equipment. Compare installed equipment and materials to construction drawings and compare the installation for compliance to the design and completeness including all terminations being made; proper voltage at the power source; hangers and seismic protection

installed; and connection to the controls. Obtain the manufactures' recommended procedure for testing the equipment where appropriate.

### **Equipment Check**

Check to see that all packing materials have been removed.

## **Backflow Prevention Start Up Procedure**

Start up the backflow preventor per the manufacturer's recommendations using test report *Backflow Prevention Assembly Test Report* (EN-MPS-722m) to record the start up.

## **Boiler Start Up Procedure**

Start up the boilers per the manufacturer's recommendations using test form *Boiler Start Up* (EN-MPS-722a) to record the start up.

## **Cabinet (Terminal) Heater Start Up Procedure**

Start up the terminal heater per the manufacturer's recommendations and utilize test form *Cabinet Heater/Heater Start Up* (EN-MPS-722b) to record the start up.

## **Fan Start Up Procedure**

Start up the fan per the manufacturer's recommendations and utilize test form *Fan Start Up* (EN-MPS-722c) to record the start up.

## Fan Coil Start Up Procedure

Start up the fan coils per the manufacturer's recommendations and utilize test form *Fan Coil Unit Start Up* (EN-MPS-722d) to record the start up.

## Fuel Heater Start Up Procedure

This procedure is to start up heaters for fuel, not fuel burning heaters. Start up the fuel heater per the manufacturer's recommendations and utilize test forms *Fuel Heater Start Up* (EN-MPS-722j) to record the start up.

## Heat Exchanger Start Up Procedure

Start up the heat exchangers per the manufacturer's recommendations and utilize test form *Heat Exchanger Start Up* (EN-MPS-722e) to record the start up.

## Pump Start Up Procedure

Start up the pump per the manufacturer's recommendations and utilize test form *Pump Start Up* (EN-MPS-722f) or *Fuel Pump Start Up* (EN-MPS-722k), as applicable, to record the start up.

## RTU/AHU Start Up Procedure

Start up the air handler per the manufacturer's recommendations and utilize test form *RTU/AHU Start Up* (EN-MPS-722g) to record the start up

## Storage Tank Start Up Procedure

Start up tanks per the manufacturer's recommendations using test form *Storage Tank Start Up* (EN-MPS-722h) or *Fuel Tank Start Up* (EN-MPS-722l), as applicable, to record the start up.

## Vacuum Pump Start Up Procedure

Start up the vacuum pump per the manufacturer's recommendations and utilize test form *Vacuum Pump Start Up* (EN-MPS-722i) to record the start up.

## References

*Backflow Prevention Assembly Test Report* (EN-MPS-722m)

*Boiler Start Up* (EN-MPS-722a)

*Cabinet Heater-Heater Start Up* (EN-MPS-722b)

*Fan Start Up* (EN-MPS-722c)

*Fan Coil Unit Start Up* (EN-MPS-722d)

*Fuel Heater Start Up* (EN-MPS-722j)

*Fuel Pump Start Up* (EN-MPS-722k)

*Fuel Tank Start Up* (EN-MPS-722l)

*Heat Exchanger Start Up* (EN-MPS-722e)

*Pump Start Up* (EN-MPS-722f)

*RTU/AHU Start Up* (EN-MPS-722g)

*Storage Tank Start Up* (EN-MPS-722h)

*Vacuum Pump Start Up* (EN-MPS-722i)

ASHRAE - American Society of Heating Refrigeration & Air Conditioning Engineers  
<http://www.ashrae.org/>

ASME - American Society of Mechanical Engineers <http://www.asme.org>

ASTM - American Society for Testing & Materials <http://www.astm.org>

SMACNA – Sheet Metal and Air Conditioning Contractor's National Association  
<http://www.smacna.org/>



## **Records**

See the above forms under the FEMC-MPS tab of the *FEMC Records Management Table* (EN-D-226a).